BearingPoint ®
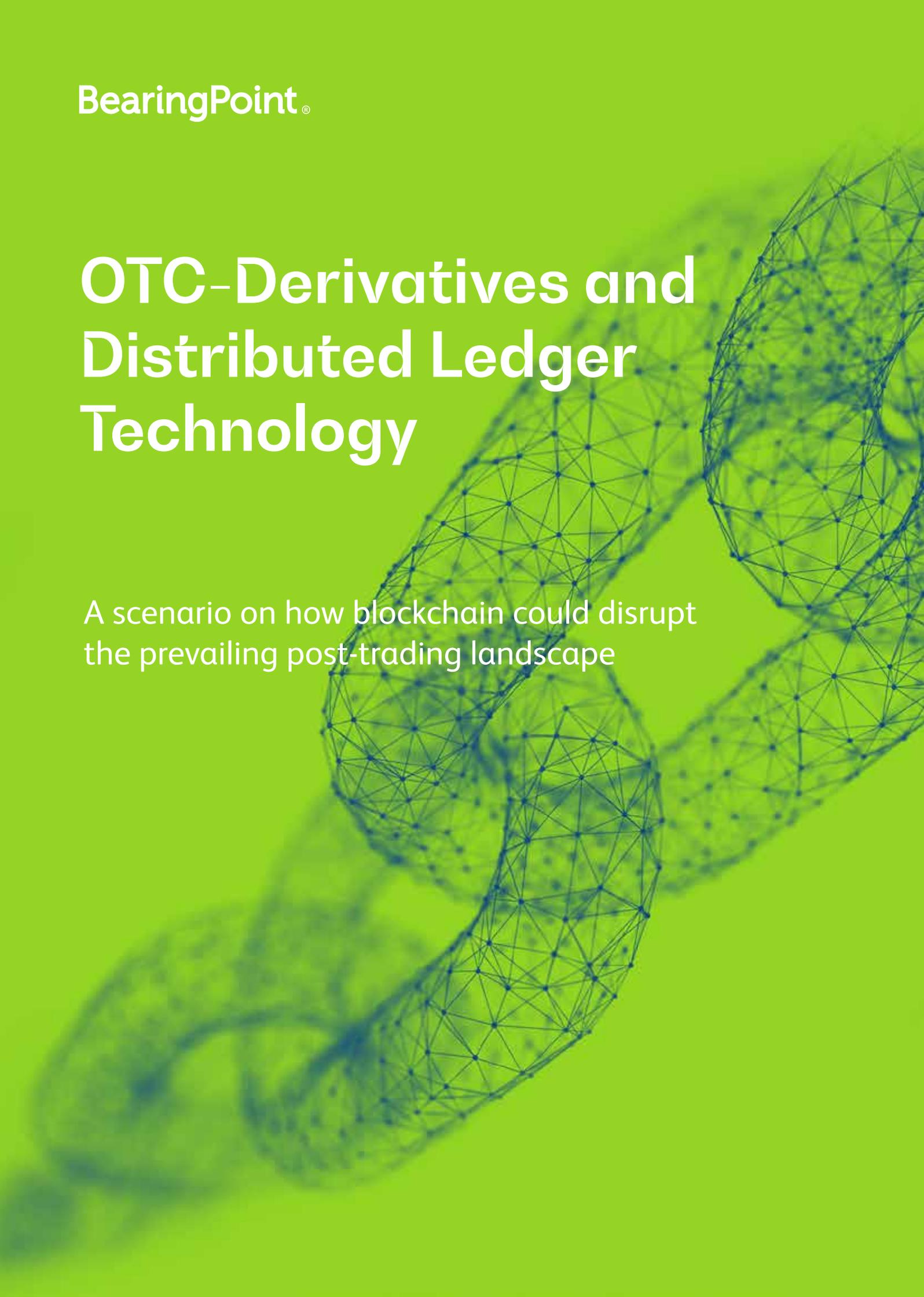
OTC–Derivatives and Distributed Ledger Technology

A scenario on how blockchain could disrupt the prevailing post-trading landscape

BearingPoint ®

OTC–Derivatives and Distributed Ledger Technology

A scenario on how blockchain could disrupt the prevailing post-trading landscape

Table of contents

OTC-Derivatives and Distributed Ledger Technology

A scenario on how blockchain could disrupt the prevailing post-trading landscape

Executive summary

- It is very much possible that capital markets including derivatives markets will adopt a decentralized structure.

- Ledgers can decrease data inconsistencies and communication errors due to technology issues.

- Transaction costs will decrease.

- Distributed ledger technologies could make workforce of regulatory authorities or central clearing houses obsolete.

- Regulators could directly access trading information on shared platforms instead of requesting it laboriously.

- Systematic and specific risks could be detected earlier.

- Regulating authorities can intervene faster to market or counterparty failures.

- Blockchain solutions will cause advantageous effects only, if trading peers concentrate forces and build a well-performing environment. Therefore, it is required that self-built software of network participants will be compatible to each other via common standards.

- Centralized and decentralized structures do not rule out each other automatically. They could cooperate and interact with one another in a hybrid system.

Introduction

Regulatory Authorities, large banks and financial services providers engage in blockchain and distributed ledger technologies, which could possibly cause a disruptive change in securities markets. The blockchain hypes forces financial institutions to digitize assets of any kind in to decrease transaction costs that occur when transferring property rights. First solutions set up coins or tokens, that represent certain fungible assets built on a distributed ledger framework.

Establishing a central clearing house that functions as middleman in derivatives transactions was one of the major regulatory goals to increase market transparency and to reduce default risk. Notaries in the interface between asset and derivatives ledger could simply take over this job without any negative implications for derivatives markets. However, if considered in different scenarios, Blockchain solutions are about to further increase transparency about the ownership of assets and certificates.

In addition to that, distributed ledger technology also seems to decentralize certain processes – especially clearing and settlement. Will these decentralization effects have a negative impact on counterparty risk? Do notaries of DLT networks have to take on all the tasks that are currently performed by central clearing institutions and other back-office institutions?

This whitepaper elaborates two ledger scenarios as potential transformations of derivatives markets. Table 1 draws an outline on the centralized and decentralized adoption of blockchain technology in derivatives processing. The following statements highlight opportunities as well as risks when it comes to the simplification of processing collateralized derivatives by DLT.

Basic scenario content

Both scenarios (centralized DLT system and decentralized system) are based on two kinds of ledgers. The derivatives ledger and the asset ledger.

Last named requires a working trading system of tokenized assets.

Trading tokenized assets

Such tokenized assets make use of advantageous features in cryptocurrency networks such as the tamper-proof transfer of ownership. Next to physical assets also certified securities such as bonds or stocks might soon get a digital identity. Moreover, tokenized securities fulfil the standards for further transactions, that require any kind of deposit for execution, as for instance derivatives.

Building on this, financial institutions could use digital assets for collateralized derivatives and thereby destroy the current post-trading landscape that is needed to guarantee collateralization and the collateral's settlement. This raises the question who is entitled to run the newly founded interface between collateralized derivatives and tokenized assets?

Asset ledger

Tokenized assets that could serve as a collateral are traded on a decentralized ledger. Contractual parties store cash-like valuables in such an environment. Several sub-ledgers each reflect certain financial industries or asset classes like bonds, stocks or treasury notes. It is assumed that those assets will be available on shared platforms soon.

Derivatives ledger

The contracting platform uses smart contracts to trade collateralized derivatives. Interfaces are utilized to automate pending collateral requests such as initial margin calls. This grants the opportunity to execute transactions based on the account balance of tokenized securities in the asset ledger.

It requires notaries that link these two ledgers. Furthermore, regulators get direct access to both ledgers to observe trading, or at least receive automated reports that are generated as a result of past ledger transactions.

Figure 1 indicates the interaction between trading peers, regulatory authorities and trusted external notaries.
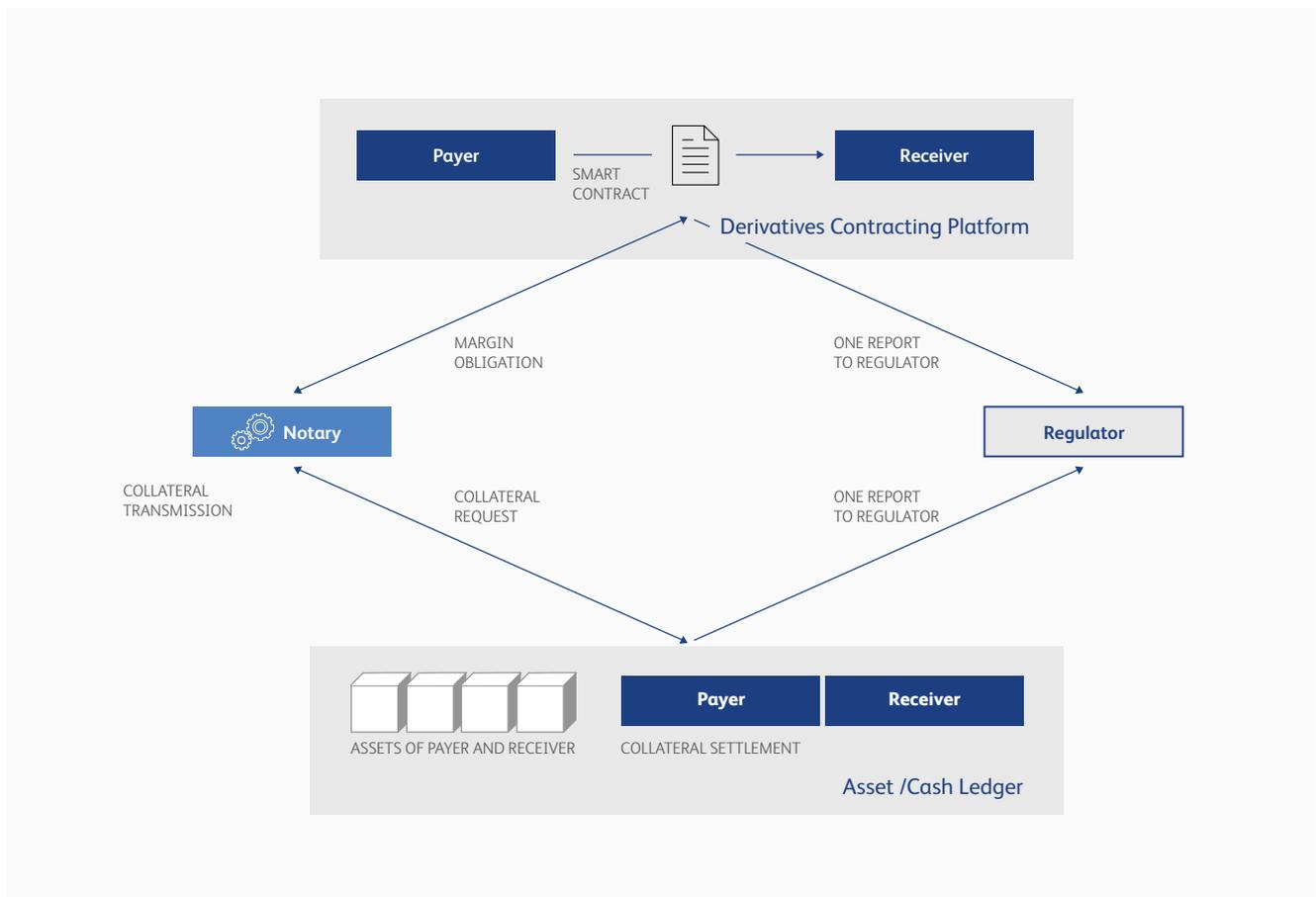

Figure 1: Future DLT environment

The scenarios

Current landscape

For centrally cleared certificates, clearing houses are obliged to take on the counterpart for both traders to reduce default risks. Other parties involved in derivatives trading are trade repositories, securities depositories or custodian banks that safeguard the traders' collateral until it is pledged at the CCP.

Scenario one: Centralized DLT System

As opposed to the current system, the CCP in the outlined centralized system functions as a notary node that simply combines the two ledgers of derivatives and securities. The notary passes through transaction information and validates that margin requirements are fulfilled as well as collaterals are settled.

Scenario two: Decentralized System

In the second scenario, trading peers such as banks operate the interface by themselves. Validation mechanisms allow them to verify transactions without involving a trusted third party. No external service is required to store, transfer and settle collateralized assets. Peers that have access to tamper-proof and valid information, trust in a shared ledger network that do not need an administrative middleman.

The centralized and decentralized scenarios of DLT adoption reflect extremes. Realistic scenarios most likely involve peers as
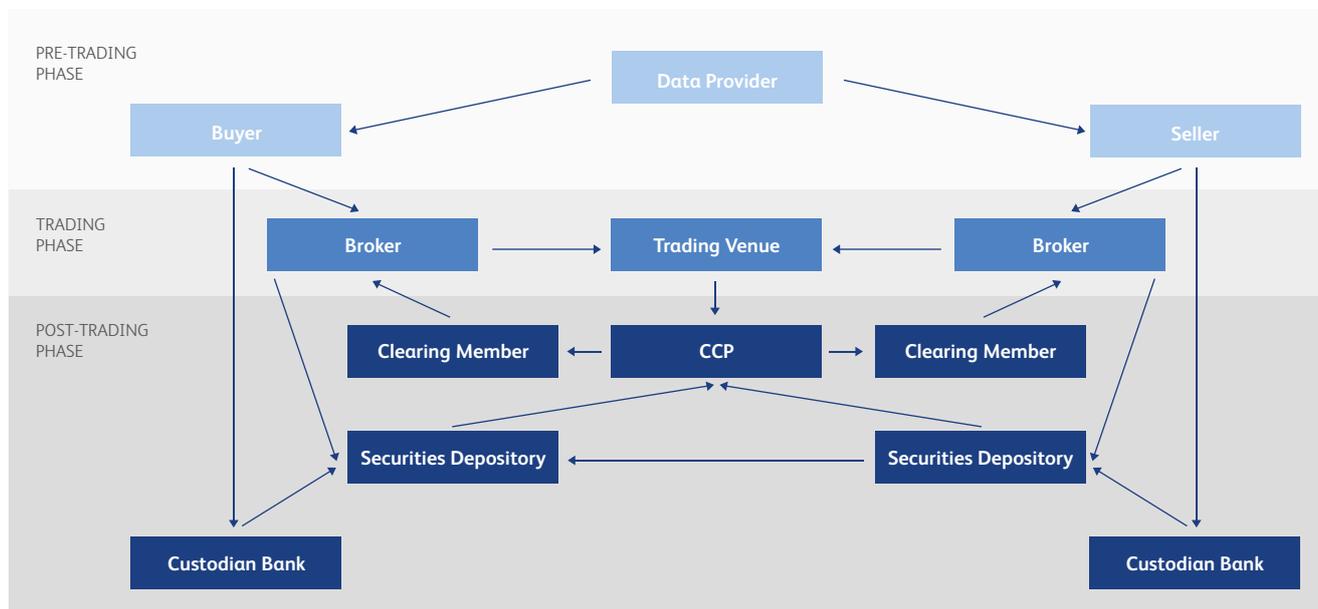

Figure 2: Current landscape, Source: https://www.ecb.europa.eu/pub/pdf/scpops/ecbop172.en.pdf, Page 20
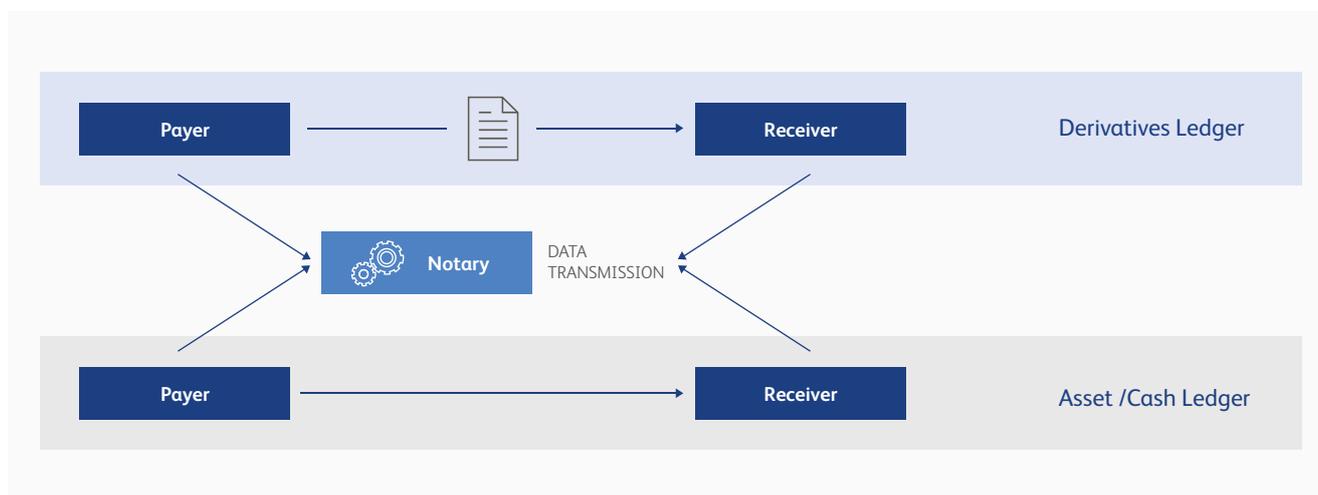

Figure 3: Centralized DLT system

well as trusted notaries to run verification processes. However, both cases lead to less complex structures compared to the existing landscape. Depending on who governs the two ledgers, both scenarios have potential to make members of the incumbent trading landscape obsolete.
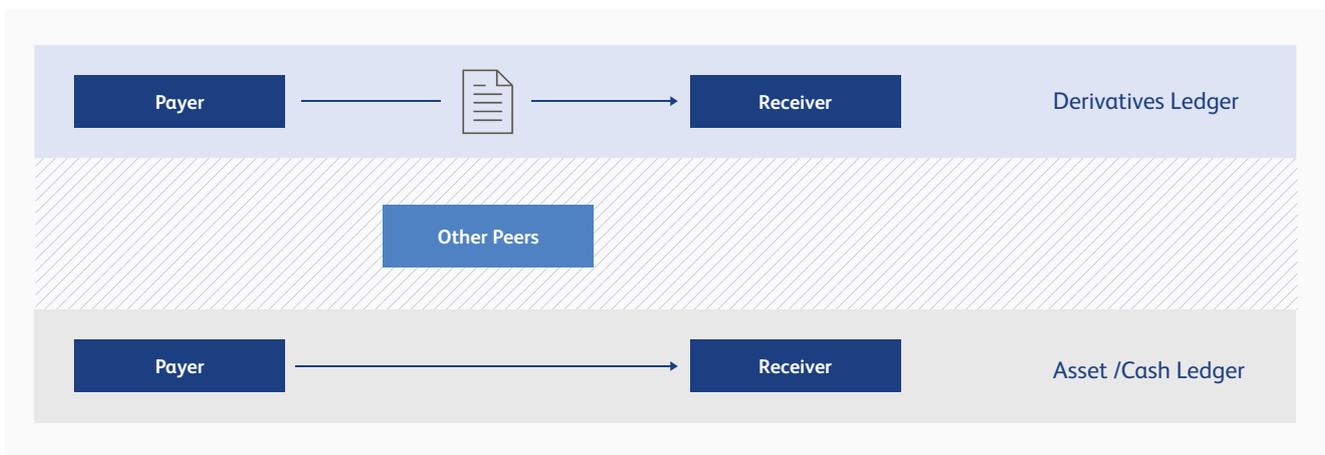

Figure 4: Decentralized system

Statements & comments

"DLT could enhance derivatives processing systems in terms of interoperability"

To clear and settle derivatives transactions calls for a variety of manual action. The most burdensome tasks include continuous valuing, maintaining records about ownership and arranging cross-system margin obligations. Standardized interfaces between the asset and the derivatives ledger could reduce the number of manual processes to almost zero.

Blockchain technology in the centralized scenario of two immutable ledgers will enhance process efficiency due to a less complex processing landscape. Notaries align confidential data with the asset ledger and check for available collateral. They work as gatekeepers and take over parts of the tasks that central counterparties perform today. Because ledgers and the access for peers will be standardized, miscommunication due to technology constraints can be significantly reduced.

The entirely decentralized system, governed by the peers themselves, can maximize interoperability. Interfaces between the two ledgers would not be needed anymore, since peers were able to execute collateral requests without external network hosts.

"The number of involved contractual parties is crucial for a blockchain network's success"

The whole world of blockchain and distributed ledger technology is built around the concept of trust. Trust is generated by notaries and all nodes that run algorithms to certify that a certain state of the world is true. These nodes create consensus of current asset allocations in both ledgers. The more parties join the two ledger structure by processing their transactions, the larger the networks' trust evolves. Obviously, a higher number of transactions leads to economies of scale for validation. Costs per transaction dwindle considerably.

Additionally, consortia share initial investment costs for developing the ledger structure. Being a first mover without any partners might not result in the desired cost-cutting effects, but high development costs. Consortia that focus on developing a derivatives ledger will only be successful, if sufficient interfaces to already existing asset ledgers are provided, and the platform as such is widely used and broadly accepted.

"If central institutions adopt blockchain technologies, market fragmentation will decrease while standardization will further increase"

Consortia not only grant the option to share development costs, but also found industry standards. Recent developments show a strong concentration on just a few distributed ledger software packages, as for instance Corda and Hyperledger. This enforces a higher degree of standardization.

Current trusted intermediaries are challenged by consortia to come up with ledger solutions that significantly decrease supervision and processing effort. In order to maintain competitiveness, trade repositories, securities depositories, central counterparties as well as trading venues should team up. Central institutions that do not join such strategic alliances will soon face severe cost disadvantages. As a result, institutions that are adopting distributed ledger architectures implicitly cause reduced market fragmentation. The number of back-office institutions will lower drastically. Only those intermediaries that conduct businesses in the most cost-efficient way, will survive.
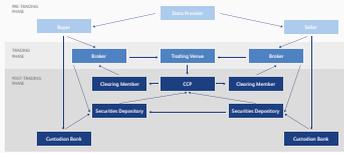
Comparison Criteria	Non-DLT	DLT	
	Current Landscape	Centralized System	Decentralized System
Trading Landscape			
Interoperability	Increasing →		
Standardization	Increasing →		
Validation Processing	CCP, CSD, TR, Custodian Banks	External notaries (dependent on network lead)	Trading community
Settlement	T+2 (securities transactions)	Reduced settlement period possible	Instantaneous
Netting	Yes	Yes (dependent on settlement period)	No
Collateral	According to regulatory requirements	Increased demand of collateralized assets if settlement period decreases	Increased demand for collateralized assets; high number of collateral transactions

Table 1: Scenario summary

"Settlement periods of DLT markets could diminish to almost zero what makes netting processes impossible"

Besides enforced competition between incumbent intermediaries, newly founded distributed ledger systems have impacts on market characteristics. Due to the discontinuation of multi-stage processes and the omission of system changes, collateral settlement times might lower to zero. Technological progress makes settlement times of T+2 days or more no longer contemporary.

Even though fast-paced clearing and settlement facilitated by distributed ledger technology might sound like the solution to an immemorial problem, immediate asset transfers cause costs due to an increased amount of required collateral. While current netting processes reduce the traded quantity of collateral, especially the decentralized scenario will ask for immediate processing. Since the exclusion of central clearing houses abandons the option to transfer counterparty risk, trading derivatives and settling tokenized assets for margin simultaneously, is the only solution to circumvent a trusted third party.

"Regulatory reporting might no longer be needed, since regulators can directly access data of shared platforms"

In addition to the mentioned tasks, back-office processes entail the communication to regulatory authorities. Reporting is increasingly recognized to be a serious transaction cost component for banks.

Prevailing standards set by the European Market Infrastructure Regulation prompt both parties in privately negotiated contracts to report the same figures to the responsible authority.

In the two ledger DLT scenarios, a signed contract as well as the confirmation on collateral is transmitted automatically to the regulator. Costly matching of reports does not occur anymore, since both parties report the same data. However, the role of the regulator could change from a passive "data-receiving" – to an active "data gathering" network member. Regulators in both DLT scenarios could access reports faster or even use analytical software on real time ledger-data to identify undesired market patterns and react correspondingly.

"Transaction costs that occur because of regulatory requirements will heavily decrease on DLT platforms"

In a blockchain world that is based on two immutable transaction ledgers, regulating authorities that have access to the whole transaction chain, would no longer need to request portfolio information of financial institutions. Reporting efforts that occur due to technological frontiers are directly tackled by Blockchain technology. The two examples of portfolio reconciliation and compression perfectly reflect what is meant by those frontiers.

Currently reconciliation needs to be performed to keep track on outstanding derivative balances between two parties on OTC-platforms.

Additionally, trade repositories need to report reconciliation in order to ensure data consistency. A jointly controlled derivatives ledger ensures that those reconciliation reports will no longer be needed. Since a trade is only executed, if both contractual parties agreed on the same underlying data, the platform owners (potentially TRs/ CCPs) grant access to already reconciled portfolios for the regulator. The same results for EMIR requirements on portfolio compressions. Using mutually confirmed data, the compression among institutions becomes obsolete if derivatives are native to the same ledger and current prices of the underlying values are provided.

In the decentralized scenario both reporting measures would need to be performed frequently. Instantaneous settlements shift compression tasks from special reporting tools to constantly updated account balances on the derivatives ledger.

"Since financial institutions share more trade information in distributed ledger systems, trading will suffer from less information asymmetries"

The level of transparency between trading partners is the crucial factor to answer the question whether rather centralized or decentralized distributed ledger systems will predominate. As long as most of the transactions require trusted third parties, the information situation of a single peer will not change significantly. Otherwise, if cost-cutting effects in the decentralized scenario encourage peers to process transactions by themselves, they will need to increase the level of data exchange. Financial institutions might then suffer from a shrinking degree of anonymity, while trading as such will become more efficient.

Revisiting Blockchain as a technology of trust, fraud protection in DLT environments is another argument for less information asymmetries. At the moment, due to complex monitoring, there is no overall safeguarding entity that could prove whether one asset is used for multiple contracts. Settlement failures do not only occur in securities markets, but also when it comes to collateralization in derivatives trading. Figure 2 shows the two main fraud issues that occur in current trading systems. Comparing this to Figure 1, in the two ledger scenarios, the information that a certain asset was already pledged for collateral, cannot be stored. For the centralized scenario, the interaction between derivatives and potential multiple asset ledgers decides, whether failures can still occur. In the decentralized case, since information and collateral are instantaneously processed, no settlement failures occur anymore.
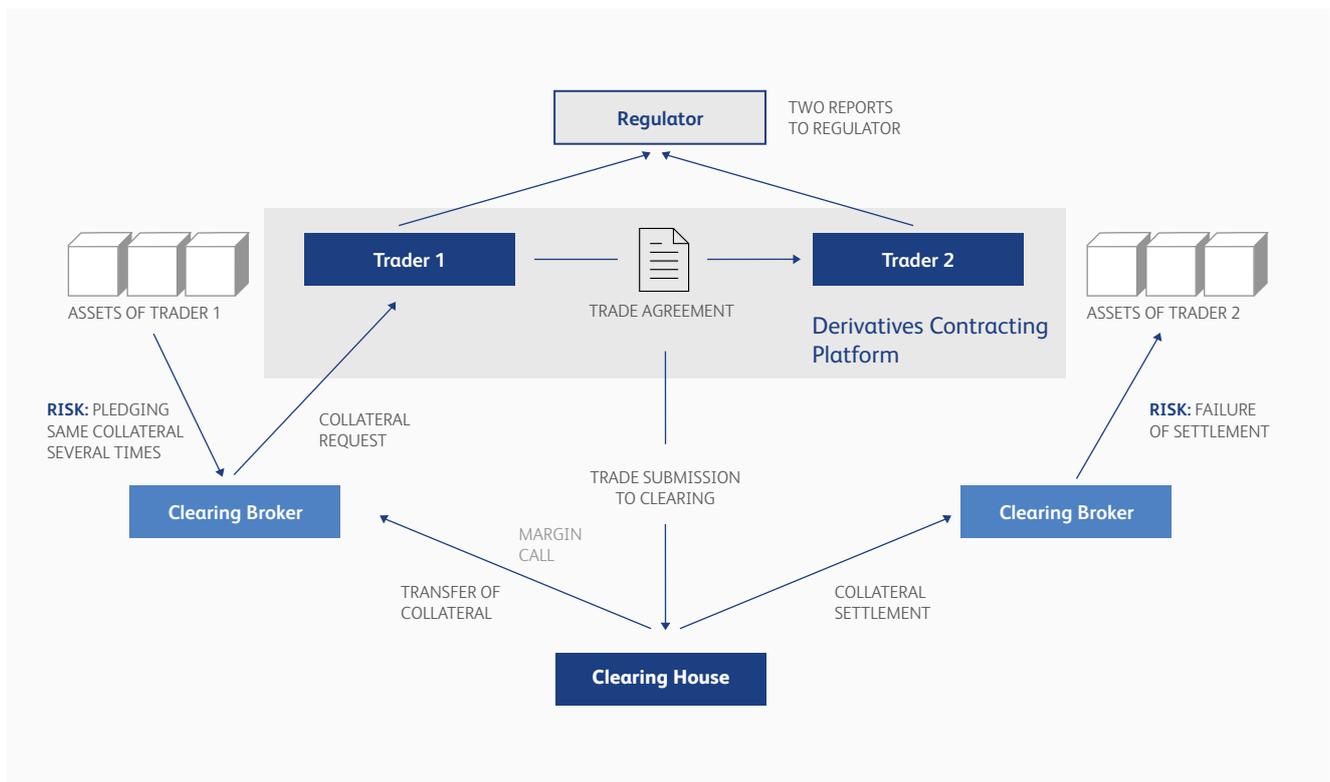

Figure 5: Processing of margin call in current landscape

Concluding remarks

Distributed ledger networks that eliminate a central counterparty do not meet regulatory standards of modern markets. However, we can already observe an ongoing development from the actual complex post-trading landscape towards centralized DLT solutions that try to exclude the middleman. It might be solely a question of time until securities markets and maybe also derivatives markets entirely adopt a decentralized structure.

Besides the willingness of financial institutions to increase transparency, we emphasize the role of regulators to have a vital effect on the success of blockchain technology. Furthermore, we found the number of active participants in the two ledger scenarios, to be a major driver of the utilization of advantages.

A considerably large number of institutions already investigate the possibility of developing an own distributed ledger solution. To achieve high standards in terms of efficiency, more of these networks need to interact with each other. Blockchain solutions will cause advantageous effects only, if trading peers join forces and build an environment that is able to reduce regulatory burden as well as other back-office processing costs.

Contacts

Dr. Robert Bosch
Partner
robert.bosch@bearingpoint.com

Moritz Plenk
Manager
moritz.plenk@bearingpoint.com

Authors: Daniel Münch, Jan Swiatkowski

This paper is based on a master's thesis at the University of Hohenheim in cooperation with BearingPoint
(project team: Robert Bosch, Moritz Plenk, Daniel Muench, Jan Swiatkowski).

About BearingPoint

BearingPoint is an independent management and technology consultancy with European roots and a global reach. The company operates in three units: Consulting, Solutions and Ventures. Consulting covers the advisory business; Solutions provides the tools for successful digital transformation, regulatory technology and advanced analytics; Ventures drives the financing and development of start-ups. BearingPoint's clients include many of the world's leading companies and organizations. The firm has a global consulting network with more than 10,000 people and supports clients in over 75 countries, engaging with them to achieve measurable and sustainable success.

For more information, please visit: www.bearingpoint.com